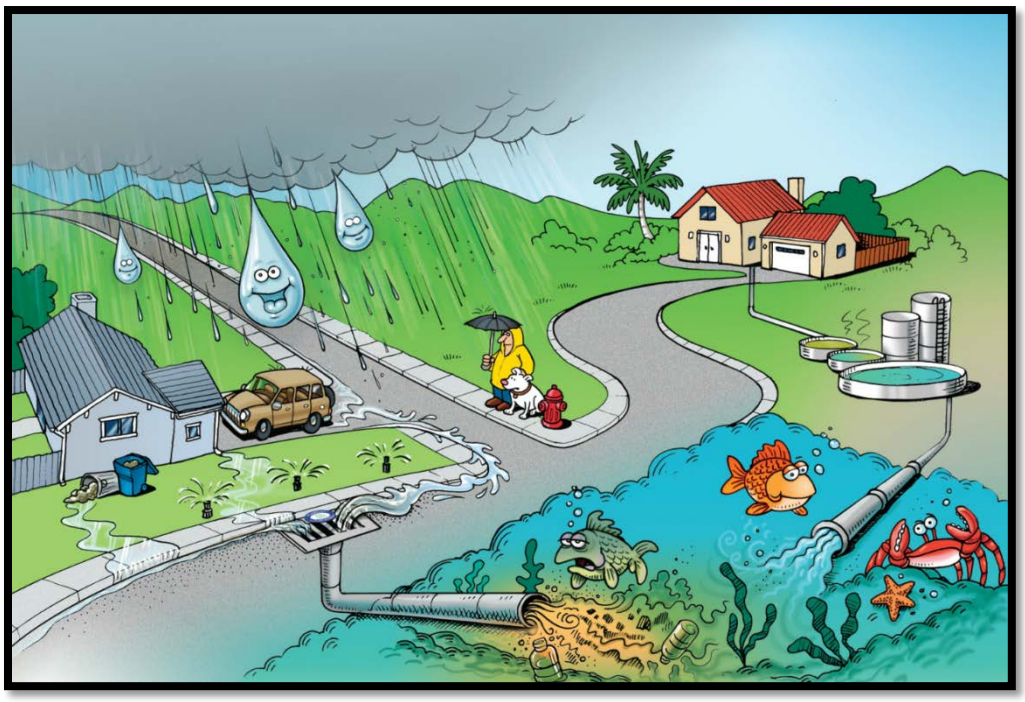
HOW WOULD YOU CLEAN UP THE OCEAN? K-6 ADAPTABLE EXPERIMENT

"Undoing" water pollution!

Start the lesson by playing National Geographic's, "Gyre: Creating Art from a Plastic Ocean" teaser trailer or full length documentary. If the students are too young for this material utilize "One World, One Ocean" and one of their many videos on the importance of the ocean. It may be wise to play your chosen video the day before you decide to do the experiment so you have enough time to complete your experiment in class.

https://www.youtube.com/watch?v=XWa4W7xjNW8 GYRE teaser trailer (1 min. 47 sec.)
https://www.youtube.com/watch?v=cr5m8b28eqA GYRE full-length documentary (20 min. 14 sec.)
http://www.oneworldoneocean.com/pages/why-the-ocean One World, One Ocean "Why the ocean?" (2 min. 2 sec.)

Explain to students that when we litter that litter ends up in the ocean. But how can that be when we live in Arizona, a place that is so far away from the sea? There are holes in the ground, called storm drains. When it rains, the water picks up the garbage, flows to the storm drains, and these drains eventually lead to…the ocean! Unlike the water that goes down our sinks or showers, the water in storm drains does NOT go to a processing plant. It is not cleaned. Our littered garbage is ending up in the sea, just like you saw in the video and you can see in the picture below.



At this point you can ask your students how they feel about this issue. How do you think the animals feel about this? Do you think this is good for the water? You can even have them write this out in a journal entry or have them draw a picture.

After discussing your feelings ask them the important question, "How would you clean it up?". The students are going to try to do just that in this experiment!

For younger students you can simply set up the buckets, give them the "tools", and have them work together for 20 minutes to try to clean the water. Yes, it may get messy, but they are learning an important lesson! The water is NOT easily cleaned! For older students we are going to go one step deeper.

In groups of 4-6, students are going to be presented a bucket of dirty "ocean" water. In this water is going to be different garbage that has been littered and washed out to sea. Possible items for you to put in their buckets: coffee

grounds, shredded paper, food the kitchen hasn't served but has to be thrown out, soil, plastic pieces, canola oil, Styrofoam pieces, or glitter.

The groups of students are going to be given different tools to clean up their water. Tool ideas include plastic forks and spoons, paper bags, Ziploc bags, plastic cups, aluminum foil, coffee filters, and tongs.

The younger students may have less of a tool selection to make it easier, perhaps only the tongs, plastic fork/spoons, and plastic cups.

The older students must first take 10 minutes and brainstorm how they are going to use these tools to clean up their ocean water. But there is a catch! Cleaning up the ocean is going to be costly, so each tool has a price, and each team only has so much money to spend. This must be factored into their plan.

Once the students have their plan they can purchase their materials and begin their clean up.

OPTIONAL: You can have both the younger and older students dirty their own water. This can be especially impactful for younger students. They will eventually see how easy it is to dirty their water, but how hard it is to clean it.

Give the groups 20 minutes to try to clean their water. During this time the older students, with any leftover money, can decide to buy impromptu supplies they feel they may now need.

Once the 20 minutes are up, take clean cups and take a scoop of each group's bucket. Label them with their group's number. Place them at the front and see who was able to "clean up" the ocean water the best (who has the clearest water).

For the older students you will also compare budgets to see who was able to keep costs down and whether that affected the cleanliness of their water.

You can follow up this experiment with:

- Writing a letter to explain what you learned about the Great Pacific Garbage Patch and the difficulties of cleaning up water.
- Reading a sustainability book, such as *The Great Kapok Tree* by Lynne Cherry, *Oil Spill* by Melvin Berger, *The Lorax* by Dr. Seuss, or *The Wump World* by Bill Peet.
- Making solar ovens or wind powered cars (experiments available through Pinterest page or googling).

MATERIALS NEEDED

- One bucket for each group (about the size of a standard mop bucket, having one with handles will help!)
- One tray for collecting tools and putting removed litter on
- One gallon of water for each group (poured into the bucket)
- Plastic forks and spoons (approximately 30)
- Tongs (one pair for each group)
- Paper bags (approximately 20)
- Ziploc sandwich bags (approximately 30)
- Plastic cups (preferably clear for end comparison, about 30)
- Aluminum foil (one roll)
- Coffee filters (about 30)
- Shredded Paper
- Soil/dirt
- Canola oil
- Plastic pieces
- Styrofoam pieces
- Glitter
- Monopoly money or some other form of money (not necessary, but helpful!)
- Lots of paper towels for cleaning up!

PURCHASING SUGGESTIONS

For each older group of 4-6 students, each group could be given about $2,500. The following monetary values could be assigned to each item. These, of course, can be changed by you!

- Plastic fork or spoon: $250
- Tongs: $400
- Paper bags: $100
- Ziploc sandwich bags: $250
- Plastic Cup: $400
- Aluminum Foil: $200
- Coffee filter: $300

TIMELINE

<u>DAY BEFORE EXPERIMENT</u>

- Watch Gyre or One World, One Ocean Video. For 15 minutes discuss your feelings about ocean pollution.

<u>DAY OF EXPERIMENT</u>

- Split class into groups of 4-6 students; have the students assign one teammate to be the money handler/tool purchaser (5 minutes).
- Have the students write out their plan for cleaning up the water, including what tools they will use and the total monetary cost of their clean-up. Remind them that they can reserve funds to use during the experiment to purchase additional supplies (10 minutes).
- Have the students purchase their tools. Only the money handler/tool purchaser may leave their group and come to your table to purchase the tools. All other individuals must stay in their respective area (10 minutes).
- Have the students clean their water. If the group decides it needs additional supplies, the money handler/tool purchaser can come to you to purchase them (20 minutes).
- Clean up! While the groups clean up, take a scoop from each of their buckets and place them, labelled, at the front of the classroom (5 minutes).
- Discuss the results of the experiment and their observations (10 minutes).

INSPIRATION PHOTOS & EXPERIMENTS

YOUNGER GROUP
http://gironlife.blogspot.com/2010/04/experiment-can-you-undo-water-pollution.html

OLDER GROUP
https://beyondtraditionalmath.wordpress.com/2014/04/21/earth-day-water-pollution-activity-a-cross-curricular-inquiry-study/